

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

Refine Search

Search Results -

Terms	Documents
L1 same (signal near5 pin)	64

Database:

US Pre-Grant Publication Full-Text Database
 US Patents Full-Text Database
 US OCR Full-Text Database
 EPO Abstracts Database
 JPO Abstracts Database
 Derwent World Patents Index
 IBM Technical Disclosure Bulletins

Search:

L3

Search History

DATE: Friday, October 08, 2004 [Printable Copy](#) [Create Case](#)

Set Name Query

side by side

Hit Count Set Name

result set

DB=PGPB,USPT,USOC; PLUR=YES; OP=OR



<u>L3</u>	L1 same (signal near5 pin)	64	<u>L3</u>
<u>L2</u>	L1 and (signal near5 pin)	155	<u>L2</u>
<u>L1</u>	(select\$4 near3 path) near10 pin	502	<u>L1</u>

END OF SEARCH HISTORY

Search Results -

Terms	Documents
L3	0

US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

L4	
	

Refine Search

Recall Text

Clear

Interrupt

Search History

DATE: Friday, October 08, 2004 Printable Copy Create Case

<u>Hit Count</u>	<u>Set Name</u>
	result set

DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR

L4 L3

0

L4

DB=PGPB,USPT,USOC; PLUR=YES; OP=OR

L3 L1 same (signal near5 pin)

64

L3

L2 L1 and (signal near5 pin)

155

L2

L1 (select\$4 near3 path) near10 pin

502

L1

END OF SEARCH HISTORY

Refine Search

Search Results -

Terms	Documents
(439/189 439/497 439/507 439/620 439/505 174/34 361/683 361/686 361/752 361/760 709/253 710/3 710/100 710/300 710/305 710/301 710/316 710/1 710/313 710/72 710/63 340/825.52 235/462.15 714/25).ccls.	15864

Database:

US Pre-Grant Publication Full-Text Database
 US Patents Full-Text Database
 US OCR Full-Text Database
 EPO Abstracts Database
 JPO Abstracts Database
 Derwent World Patents Index
 IBM Technical Disclosure Bulletins

Search:

L5

Refine Search

Recall Text

Clear

Interrupt

Search History

 DATE: Friday, October 08, 2004 [Printable Copy](#) [Create Case](#)
SetName Query

side by

side

DB=PGPB,USPT,USOC; PLUR=YES; OP=OR
L5 710/3,100,300,305,301,316,1,313,72,63;439/189,497,507,620,505;235/462.15;361/683,686,752,7

DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR
L4 L3
DB=PGPB,USPT,USOC; PLUR=YES; OP=OR
L3 L1 same (signal near5 pin)L2 L1 and (signal near5 pin)L1 (select\$4 near3 path) near10 pin

END OF SEARCH HISTORY

Refine Search

Search Results -

Terms	Documents
L3 and L5	5

Database:

US Pre-Grant Publication Full-Text Database
 US Patents Full-Text Database
 US OCR Full-Text Database
 EPO Abstracts Database
 JPO Abstracts Database
 Derwent World Patents Index
 IBM Technical Disclosure Bulletins

Search:

L6

Refine Search

Recall Text

Clear

Interrupt

Search History

DATE: Friday, October 08, 2004 [Printable Copy](#) [Create Case](#)

SetName Queryside by
side

DB=PGPB,USPT,USOC; PLUR=YES; OP=OR

L6 L3 and L5L5 710/3,100,300,305,301,316,1,313,72,63;439/189,497,507,620,505;235/462.15;361/683,686,752,7

DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR

L4 L3

DB=PGPB,USPT,USOC; PLUR=YES; OP=OR

L3 L1 same (signal near5 pin)L2 L1 and (signal near5 pin)L1 (select\$4 near3 path) near10 pin

END OF SEARCH HISTORY

EAST - [Untitled1:1]

FileViewEditToolsWindowHelp

Drafts

Pending

Active

L1: (287) (select\$4 near3

L2: (75) 11 same signal

L3: (23) 12 and network

Failed

Saved

Favorites

Tagged (0)

UDC

Queue

Trash

Search

DBs

USPAT

Plurals

Highlight all hit terms initially

Default operator: OR

BRS I

IS&R

Image

Text

HTML

	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	Error Definition	Err
1	BRS	L1	287	(select\$4 near3 path) near10 pin	USPAT	2004/10/08 13:26			0
2	BRS	L2	75	11 same signal	USPAT	2004/10/08 13:27			0
3	BRS	L3	23	12 and network	USPAT	2004/10/08 13:27			0

Start

Client Manager

EAST - [Untitled1:1]

EAST - [Untitled1:1]

File View Edit Tools Window Help

Drafts
Pending
Active
 L1: (287) (select\$4 near3
 L2: (75) 11 same signal
 L3: (23) 12 and network
Failed
Saved
Favorites
Tagged (0)
UDC
Queue
Trash

Search List Browse Queue Clear
DB: USPAT Plurals
Default operator: OR Highlight all hit terms initially
12 and network

BRS I... IS&R Image Text HTML

	U	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef
1	<input type="checkbox"/>	<input type="checkbox"/>	US 6667895 B2	20031223	22	Integrated circuit device and module with integrated	365/63	257/737; 365/189.02;
2	<input type="checkbox"/>	<input type="checkbox"/>	US 6650142 B1	20031118	51	Enhanced CPLD macrocell module having selectable	326/41	326/39
3	<input type="checkbox"/>	<input type="checkbox"/>	US 6421808 B1	20020716	50	Hardware design language for the design of integrated	716/1	703/14
4	<input type="checkbox"/>	<input type="checkbox"/>	US 6058252 A	20000502	38	System and method for generating effective layout	716/10	
5	<input type="checkbox"/>	<input type="checkbox"/>	US 5799036 A	19980825	18	Computer system which provides analog audio	375/222	710/72
6	<input type="checkbox"/>	<input type="checkbox"/>	US 5774793 A	19980630	11	System and method for interfacing diversely	455/418	439/502; 439/955;
7	<input type="checkbox"/>	<input type="checkbox"/>	US 5752082 A	19980512	16	System for multiplexing pins of a PC card socket and PC	710/62	370/465; 379/93.05;
8	<input type="checkbox"/>	<input type="checkbox"/>	US 5621312 A	19970415	11	Method and apparatus for checking the integrity of a	324/158.1	
9	<input type="checkbox"/>	<input type="checkbox"/>	US 5241277 A	19930831	12	Test system for automatic testing of insulation	324/538	324/158.1
10	<input type="checkbox"/>	<input type="checkbox"/>	US 5239213 A	19930824	16	Precision timing control programmable logic device	326/38	326/41
11	<input type="checkbox"/>	<input type="checkbox"/>	US 5155432 A	19921013	31	System for scan testing of logic circuit networks	324/763	714/731

Start Client Manager EAST - [Untitled1]

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE



Membership Publications/Services Standards Conferences Careers/Jobs

IEEE Xplore®
 RELEASE 1.8

 Welcome
 United States Patent and Trademark Office

[Help](#) [FAQ](#) [Terms](#) [IEEE Peer Review](#)
[Quick Links](#)

Welcome to IEEE Xplore®

- ☐ Home
- ☐ What Can I Access?
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced
- ☐ CrossRef

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account
- ☐ Access the IEEE Member Digital Library

IEEE Enterprise

- ☐ Access the IEEE Enterprise File Cabinet

Print Format

 Your search matched **3** of **1076880** documents.

 A maximum of **500** results are displayed, **15** to a page, sorted by **Relevance Descending** order.

Refine This Search:

You may refine your search by editing the current search expression or entering new one in the text box.

☐ Check to search within this result set

Results Key:

JNL = Journal or Magazine **CNF** = Conference **STD** = Standard

1 Design and VLSI implementation of a novel concurrent 16-bit multiplexed accumulator for DSP applications

Poornaiah, D.V.; Haribabu, R.; Ahmad, M.O.;
Acoustics, Speech, and Signal Processing, 1993. ICASSP-93., 1993 IEEE International Conference on , Volume: 1 , 27-30 April 1993

Pages:385 - 388 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(296 KB\)\]](#) IEEE CNF

2 Parasitic characteristics of BGA packages

Chang, T.; Cheng, P.H.; Huang, H.C.; Lee, R.S.; Lo, R.;
IC/Package Design Integration, 1998. Proceedings. 1998 IEEE Symposium on Feb. 1998

Pages:124 - 129

[\[Abstract\]](#) [\[PDF Full-Text \(748 KB\)\]](#) IEEE CNF

3 A 2.5 GHz BiCMOS transceiver for wireless LAN

Meyer, R.G.; Mack, W.D.; Hageraats, J.J.E.M.;
Solid-State Circuits Conference, 1997. Digest of Technical Papers. 44th ISSCC 1997 IEEE International , 6-8 Feb. 1997

Pages:310 - 311, 477

[\[Abstract\]](#) [\[PDF Full-Text \(1172 KB\)\]](#) IEEE CNF

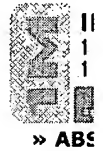
[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#) | [Join IEEE](#) | [Web Account](#) | [New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#) | [No Robots Please](#) | [Release Notes](#) | [IEEE Online Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2004 IEEE — All rights reserved

IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE



Membership Publications/Services Standards Conferences Careers/Jobs

Welcome
United States Patent and Trademark Office

Help FAQ Terms IEEE Peer Review

Quick Links

Welcome to IEEE Xplore®

- ☐ Home
- ☐ What Can I Access?
- ☐ Log-out

Tables of Contents

- ☐ Journals & Magazines
- ☐ Conference Proceedings
- ☐ Standards

Search

- ☐ By Author
- ☐ Basic
- ☐ Advanced
- ☐ CrossRef

Member Services

- ☐ Join IEEE
- ☐ Establish IEEE Web Account
- ☐ Access the IEEE Member Digital Library

IEEE Enterprise

- ☐ Access the IEEE Enterprise File Cabinet

Print Format

Search Results [PDF FULL-TEXT 296 KB] DOWNLOAD CITATION



Design and VLSI implementation of a novel concurrent multiplier-accumulator for DSP applications

Poornaiah, D.V. Haribabu, R. Ahmad, M.O.

Indian Telephone Ind. Ltd., Bangalore, India;

This paper appears in: Acoustics, Speech, and Signal Processing, 1993. : 93., 1993 IEEE International Conference on

Meeting Date: 04/27/1993 - 04/30/1993

Publication Date: 27-30 April 1993

Location: Minneapolis, MN USA

On page(s): 385 - 388 vol.1

Volume: 1

Reference Cited: 20

Inspec Accession Number: 4754281

Abstract:

The authors propose an efficient carry-save algorithm based on the Baugh-Wooley transformation technique and map it onto a novel concurrent multiplier-accumulator (CMAC) architecture that can be configured on-the-fly for **selecting** multiply-multiply-add/subtract computations involving unsigned/**signed** 2's complement mode data formats. The proposed CMAC does not require the use of a separate module, thereby achieving a reduction of 50% in the computation time along with savings in the area when compared with the conventional MACs. The CMAC, while maintaining functional as well as near total **pin** compatibility with the industry MACs, such as the ADSP1010 and TDC 1010 series, provides additional features: mixed-mode data format, saturation arithmetic logic, and on-chip test logic for measurement of the critical **path** delay. A 16×16 CMAC based on carry-save look-ahead techniques is designed and was extensively simulated with a cycle time using 1 μm CMOS gate array technology rules.

Index Terms:

16 bits Baugh-Wooley transformation CMOS gate array technology CMOS integrated circuits DSP VLSI VLSI implementation area carry logic carry look-ahead techniques computation time concurrent multiplier-accumulator critical path delay digital processing chips logic design mixed-mode data format on-chip test logic pin compatibility saturation arithmetic logic 16 bits Baugh-Wooley transformation CMOS gate array technology CMOS integrated circuits DSP VLSI VLSI implementation area carry logic carry

[techniques](#) [carry-save algorithm](#) [computation time](#) [concurrent multiplier-accumulator](#)
[path delay](#) [digital signal processing chips](#) [logic design](#) [mixed-mode data format](#) [o](#)
[logic](#) [pin compatibility](#) [saturation arithmetic logic](#)

Documents that cite this document

There are no citing documents available in IEEE Xplore at this time.

[Search Results](#) [\[PDF FULL-TEXT 296 KB\]](#) [DOWNLOAD CITATION](#)

[Home](#) | [Log-out](#) | [Journals](#) | [Conference Proceedings](#) | [Standards](#) | [Search by Author](#) | [Basic Search](#) | [Advanced Search](#) | [Join IEEE](#) | [Web Account](#) |
[New this week](#) | [OPAC Linking Information](#) | [Your Feedback](#) | [Technical Support](#) | [Email Alerting](#) | [No Robots Please](#) | [Release Notes](#) | [IEEE Online](#)
[Publications](#) | [Help](#) | [FAQ](#) | [Terms](#) | [Back to Top](#)

Copyright © 2004 IEEE — All rights reserved

Hit List



Search Results - Record(s) 1 through 5 of 5 returned.

☐ 1. Document ID: US 20040039863 A1

Using default format because multiple data bases are involved.

L6: Entry 1 of 5

File: PGPB

Feb 26, 2004

PGPUB-DOCUMENT-NUMBER: 20040039863

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20040039863 A1

TITLE: Spare input/output buffer

PUBLICATION-DATE: February 26, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Isom, Melvin T. III	Durham	NC	US	
Hegde, Shailesh U.	Cary	NC	US	

US-CL-CURRENT: 710/305

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw. De
------	-------	----------	-------	--------	----------------	------	-----------	-----------	-------------	--------	------	----------

☐ 2. Document ID: US 6738858 B1

L6: Entry 2 of 5

File: USPT

May 18, 2004

US-PAT-NO: 6738858

DOCUMENT-IDENTIFIER: US 6738858 B1

TITLE: Cross-bar matrix for connecting digital resources to I/O pins of an integrated circuit

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw. De
------	-------	----------	-------	--------	----------------	------	-----------	-----------	-------------	--------	------	----------

☐ 3. Document ID: US 5799036 A

L6: Entry 3 of 5

File: USPT

Aug 25, 1998

US-PAT-NO: 5799036

DOCUMENT-IDENTIFIER: US 5799036 A

TITLE: Computer system which provides analog audio communication between a PC card

h e b b g e e e f e g e f b e

and the computer's sound system

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Draw. De
------	-------	----------	-------	--------	----------------	------	-----------	-----------	-------------	--------	-----	----------

☐ 4. Document ID: US 5752082 A

L6: Entry 4 of 5

File: USPT

May 12, 1998

US-PAT-NO: 5752082

DOCUMENT-IDENTIFIER: US 5752082 A

TITLE: System for multiplexing pins of a PC card socket and PC card bus adapter for providing audio communication between PC card and computer sound system

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Draw. De
------	-------	----------	-------	--------	----------------	------	-----------	-----------	-------------	--------	-----	----------

☐ 5. Document ID: US 4300207 A

L6: Entry 5 of 5

File: USPT

Nov 10, 1981

US-PAT-NO: 4300207

DOCUMENT-IDENTIFIER: US 4300207 A

TITLE: Multiple matrix switching system

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Draw. De
------	-------	----------	-------	--------	----------------	------	-----------	-----------	-------------	--------	-----	----------

Clear

Generate Collection

Print

Fwd Refs

Bkwd Refs

Generate OACS

Terms

Documents

L3 and L5

5

Display Format:

Change Format

[Previous Page](#)

[Next Page](#)

[Go to Doc#](#)



US006058252A

United States Patent [19]

Noll et al.

[11] Patent Number: 6,058,252

[45] Date of Patent: May 2, 2000

[54] SYSTEM AND METHOD FOR GENERATING EFFECTIVE LAYOUT CONSTRAINTS FOR A CIRCUIT DESIGN OR THE LIKE

[75] Inventors: Mark D. Noll, Santa Clara, Calif.; Kenneth E. Scott, Sherwood, Oreg.; Robert L. Walker, Boulder, Colo.

[73] Assignee: Synopsys, Inc., Mountain View, Calif.

[21] Appl. No.: 08/910,803

[22] Filed: Aug. 13, 1997

Related U.S. Application Data

[63] Continuation of application No. 08/375,453, Jan. 10, 1995, abandoned.

[51] Int. Cl.⁷ G06F 9/453; H01L 21/70

[52] U.S. Cl. 378/906; 364/490; 364/491

[58] Field of Search 364/458, 459, 364/490, 491, 378, 393/500

References Cited

U.S. PATENT DOCUMENTS

3,629,843 12/1971 Scherman.
4,593,363 6/1986 Sumida et al..
4,615,011 9/1986 Linker.
4,630,219 12/1986 DiGiuseppe et al..
4,656,189 4/1987 Elchoud, Jr..
4,705,288 6/1988 Dowling et al..
4,901,280 2/1990 Lebacowzky.
4,937,827 6/1990 Beck et al..
4,970,180 11/1990 Skjott et al..
5,003,487 3/1991 Drumon et al..
5,084,017 9/1991 Yeyens et al..
5,095,454 3/1992 Hwang.
5,125,066 6/1992 Elfectus et al..
5,168,455 12/1992 Sharpe.
5,191,541 9/1993 Landman et al..
5,210,700 5/1993 Landman et al..
5,218,551 6/1993 Agrawal et al..
5,253,363 10/1993 Rymas.
5,396,435 3/1995 Ghent 364/458
5,402,357 3/1995 Schneider et al. 364/490
5,428,571 6/1995 Ghent et al. 364/459

5,432,730 9/1995 Dai et al. 364/578
5,461,576 10/1996 Day et al. 364/490
5,534,858 8/1997 Roederseder et al. 364/490
5,664,390 9/1997 Li et al. 364/491

OTHER PUBLICATIONS

The Olympus Synthesis System, Giovanni De Micheli et al., IEEE, Oct., 1990.

Primary Examiner—Kevin J. Tuck

Assistant Examiner—Dan Fiel

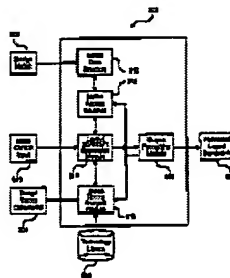
Attorney, Agent, or Firm—Kollisch, Hartwell, Dickinson, McCormick & Heuser

[57]

ABSTRACT

A computer system and computer implemented method for deriving constraints with which to direct automatic hierarchical circuit layout is disclosed. The present invention is particularly adapted for use in the design of large integrated circuits with complex synchronous timing behavior. Preferably, the invented computer system includes means for storing a netlist data structure within a storage means is provided, the netlist data structure representing a circuit configuration having a plurality of circuit elements and representing static timing information for the circuit configuration; means for selecting specified circuit elements to be used for generating the layout constraints, whereby the specified circuit elements that are selected are fewer than, i.e. represent a proper subset of, the plurality of circuit elements of the circuit configuration; means for identifying a most critical path through each of the specified circuit elements based upon the static timing information, whereby preferably the most critical path is that path having the least slack defined as the difference between a required time at which a signal should reach the specified circuit element and an arrival time at which the signal is expected to reach the specified circuit element; and means for generating layout constraints from the most critical path through each of the specified circuit elements, whereby at least one constraint is generated covering each of the specified circuit elements. Also disclosed is a feature whereby any paths that do not meet specified filter criteria, and paths that are duplicates of others, are discarded, thereby retaining only irraducible critical paths on which to base layout constraints.

16 Claims, 17 Drawing Sheets



Previous patent



US005774793A

United States Patent [19]

[11] Patent Number: **5,774,793**

Cooper et al.

[45] Date of Patent: **Jun. 30, 1998**

[54] **SYSTEM AND METHOD FOR INTERFACING DIVERSELY CONTROLLED DEVICES TO A BUS CONNECTOR HAVING A COMMON SIGNAL FORMAT**

4,972,470 11/1990 Fungo 439,955
5,249,218 9/1993 Salton 379,58
5,333,177 7/1994 Brubberg et al. 379,58
5,418,836 5/1995 Yazdani 379,58
5,479,479 12/1995 Brubberg et al. 379,58

[75] Inventors: **Gershon N. Cooper, Rodino; Andrew Holman, West Hills, both of Calif.**

[73] Assignee: **ORA Electronics, Inc., Chatsworth, Calif.**

Primary Examiner—Reinhard J. Eisenkopf
Assistant Examiner—Dennis To
Attorney, Agent, or Firm—Matthew R. Jodisiewicz

[21] Appl. No.: **361,983**

[22] Filed: **Dec. 22, 1994**

[51] Int. Cl.⁶ **H04B 1/38**

[52] U.S. Cl. **455/89; 455/345; 455/127; 379/59; 439/502; 439/555**

[58] Field of Search **455/89, 90, 127, 455/128, 344, 345, 346, 347, 348, 349, 350, 351, 331; 379/58, 59, 63, 441, 442; 439/502, 636, 505, 555**

[36] **References Cited**

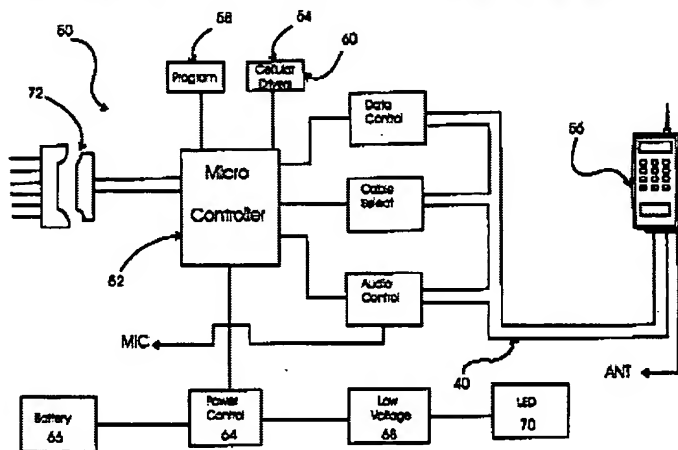
U.S. PATENT DOCUMENTS

4,876,712 10/1989 Brink et al. 439,955

[37] ABSTRACT

A system for connecting a plurality of cellular telephones, each responsive to device-specific command signals for its operation, to an automotive electronics and communications system through a bus connector having a known universal signal format, includes a docking station having a cradle member shaped for receiving at least one cellular telephone. An interface unit contains the hardware and firmware drivers necessary for controlling the selected cellular telephone. A user selected cable having a specific signal path configuration selects the needed drivers. A second cable connects the interface unit with the bus connector for communicating signals therebetween.

41 Claims, 4 Drawing Sheets



United States Patent (19)

Whetzel

(11) Patent Number: 5,056,093

(45) Date of Patent: Oct. 8, 1991

(54) SYSTEM SCAN PATH ARCHITECTURE

(73) Inventor: Lee D. Whetzel, Plano, Tex.

(73) Assignee: Texas Instruments Incorporated, Dallas, Tex.

(21) Appl. No.: 891,781

(22) Filed: Aug. 9, 1989

(51) Int. Cl. G01R 31/28

(52) U.S. Cl. 371/22.3; 371/22.1

(56) Field of Search 371/22.3, 22.1; 324/73.1

(56) References Cited

U.S. PATENT DOCUMENTS

4,494,066 1/1983 Gool et al. 371/22.3
4,710,931 12/1987 Bailey et al. 371/22.3

4,872,169 10/1988 Whetzel 371/22.3

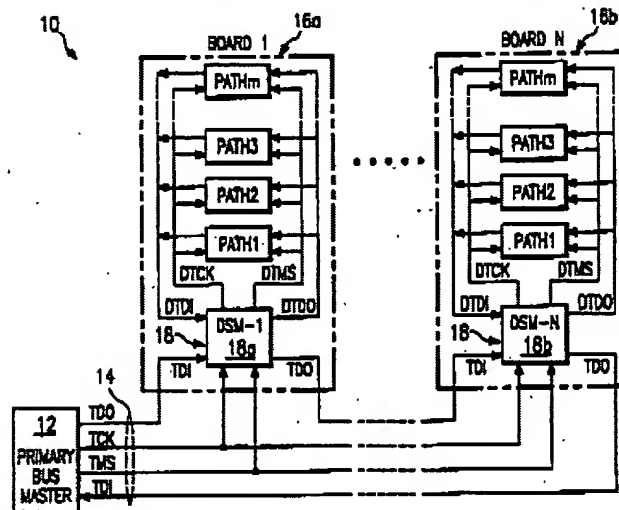
Primary Examiner—Charles E. Addison

Attorney, Agent, or Firm—B. Peter Bernick; James T. Comfort; Melvin Sharp

(57) ABSTRACT

A system scan path architecture is provided by a device select module (DSM) (18) which may be used in conjunction with associated circuits (16a-b) to select secondary scan paths (PATH1-m) on each circuit for coupling with a primary scan path on a test bus (14). The test bus (14) is controlled by a primary bus master (12). Remote bus masters (12a) may be used in conjunction with the DSMs (18) to provide serial-scan testing independent of the primary bus master (12).

41 Claims, 11 Drawing Sheets



United States Patent (19)

Jackson

3,922,537
Nov. 25, 1975

[54] MULTIPLEX DEVICE FOR AUTOMATIC TEST EQUIPMENT

[75] Inventor: Philip C. Jackson, Mahwah, N.J.

[73] Assignee: Instrumentation Engineering, Inc., Franklin Lakes, N.J.

[22] Filed: Sept. 26, 1974

[31] Appl. No.: 509,993

[52] U.S. Cl.: 235/153 AC; 324/73 R

[51] Int. Cl.: G01R 31/28

[58] Field of Search: 235/153 AC; 324/73 R; 324/73 AT; 340/172.5

[56] References Cited

OTHER PUBLICATIONS

E-M Research Laboratories, Inc., 4500/4600 Series Automated Test Systems, pp. 11-17.

Primary Examiner—R. Stephen Diklan, Jr.
Attorney, Agent, or Firm—Morgan, Finnegan, Pina, Foley & Lee

[37] ABSTRACT

The present invention pertains to multiplex apparatus for an automatic computerized diagnostic testing system for selectively interconnecting peripheral measurement and stimulus devices to a unit under test (UUT) through various switching subsystems which differ in switching capability, load carrying ability, frequency bandwidth, and mode of operation. The multiplexer includes plural conducting means between each pin of the circuit under test and corresponding terminals or test points of plural switching subsystems used to interconnect UUT pins and the peripheral testing devices. Each plural conducting means includes controllable switch means. These switch means operate automatically under programmed computer control. One of the switching subsystems has high frequency signal carrying ability, and the conducting means associated with this subsystem preferably include impedance matching buffers, and have a frequency bandwidth equal to that of the subsystem.

13 Claims, 7 Drawing Figures

